

## **WHAT IS CLAIMED IS:**

1. A method for provisioning an end user with a virtual circuit in a virtual path, comprising the steps of:

- (a) receiving a work order requesting provisioning of the virtual circuit for the end user;
- (b) determining a virtual circuit identifier of an available virtual circuit in the virtual path;
- (c) determining whether there are less than a pre-determined number of available virtual circuits remaining in the virtual path;
- (d) provisioning the virtual circuit for the end user if there are more than the pre-determined number of available virtual circuits remaining in the virtual path;
- (e) determining whether to establish additional virtual circuits in the virtual path if there are less than the pre-determined number of available virtual circuits remaining in the virtual path; and
- (f) serializing requests for additional virtual circuits to establish additional virtual circuits in the virtual path if it is determined to establish additional virtual circuits in the virtual path.

2. The method of claim 1, further comprising the steps of:

- (g) creating a conditions table comprising a plurality of conditions, each condition having a corresponding action to be performed if the condition is satisfied;
- (h) consulting the conditions table when a new order to provision the end user with a virtual circuit is received to determine an applicable condition; and
- (i) performing the action corresponding to the applicable condition.

3. The method of claim 1, further comprising the step of creating a set of serialization parameters that are used to serialize requests to establish additional virtual circuits in the virtual path.
4. The method of claim 1, further comprising the step of re-submitting an unsuccessful request to establish additional virtual circuits in the virtual path.
5. The method of claim 4, further comprising the step of determining that a request to establish additional virtual circuits in the virtual path is unsuccessful if it exceeds a pre-determined time threshold.
6. The method recited in claim 4, further comprising the step of determining that a request to establish additional virtual circuits in the virtual path is unsuccessful if it fails.
7. A system for provisioning an end user with a virtual circuit in a virtual path, comprising:
  - (a) means for receiving a work order requesting provisioning of the virtual circuit connection for the end user;
  - (b) means for determining a virtual circuit identifier of an available virtual circuit connection in the virtual path;
  - (c) means for determining whether there are less than a pre-determined number of available virtual circuit connections remaining in the virtual path;
  - (d) means for provisioning the virtual circuit for the end user if there are more than the pre-determined number of available virtual circuit connections remaining in the virtual path; and
  - (e) means for determining whether to establish additional virtual circuits in the virtual path if there are less than the pre-determined number of available virtual circuit connections remaining in the virtual path; and

(f) means for serializing requests for additional virtual circuit connections in the virtual path if it is determined to establish additional virtual circuit connections in the virtual path.

8. The system of claim 7, further comprising the steps of:

(a) means for creating a conditions table comprising a plurality of conditions, each condition having a corresponding action to be performed if the condition is satisfied;

(b) means for consulting the conditions table when a new order to provision and end user with a virtual circuit connection is received to determine an applicable condition; and

(c) means for performing the action corresponding to the applicable condition.

9. The system of claim 7, further comprising means for creating a set of serialization parameters that are used to serialize requests to establish additional virtual circuit connections in the virtual path.

10. The system of claim 7, further comprising means for re-submitting an unsuccessful request to establish additional virtual circuit connections in the virtual path.

11. The system of claim 10, further comprising means for determining that a request to establish additional virtual circuit connections in the virtual path is unsuccessful if it exceeds a pre-determined time threshold.

12. The system of claim 10, further comprising means for determining that a request to establish additional virtual circuit connections in the virtual path is unsuccessful if it fails.

13. A system for provisioning an end user with a virtual circuit in a virtual path, comprising:

(a) a connection management server that determines a virtual circuit identifier of an available virtual circuit connection in the virtual path and determines whether there are less than a pre-determined number of available virtual circuit connections remaining in the virtual path,

wherein the connection management server can initiate a request for additional virtual circuit connections;

(b) a conditions table comprising a plurality of serialization conditions that the connection management server consults prior to initiating a request for additional virtual circuit connections, the conditions in the condition table sufficient to serialize a plurality of requests made by the connection management server to establish additional virtual circuit connections; and

(c) a connection creation system that provisions additional virtual circuit connections in accordance with requests received from the connection management server.

14. The system of claim 13, wherein the connection management server determines the number of available virtual circuit connections remaining in the virtual path, and provisions an available virtual circuit connection for an end user in accordance with an order to provision a virtual circuit connection for the end user if the number of available virtual circuit connections remaining in the virtual path is greater than a pre-determined threshold.

15. The system of claim 14, wherein the connection management server consults the conditions table if the number of available virtual circuit connections remaining in the virtual path is less than the pre-determined threshold.

16. The system of claim 13, wherein the connection management server re-submits an unsuccessful request for provisioning of additional virtual circuit connections.

17. The system of claim 13, wherein the connection management server re-submits a request for provisioning of additional virtual circuit connections where a prior request for provisioning additional virtual circuit connections exceeds a pre-determined time.

18. A method for serializing bulk virtual connection requests in response to a request for provisioning of a virtual circuit connection for an end user in a virtual path that provides connectivity between the end user and an Internet service provider, comprising the steps of:

- (a) obtaining a virtual circuit identifier associated with a next available virtual circuit connection;
- (b) determining whether the virtual circuit identifier is close to an end of a range of virtual circuit identifiers that have been established;
- (c) provisioning the virtual circuit connection for the end user if the circuit identifier is not too close to a maximum value of the end of the range of virtual circuit identifiers; and
- (d) serializing sending of bulk virtual circuit connection requests to request provisioning a plurality of additional virtual circuit connections having an associated range of virtual circuit identifiers.

19. The method of claim 18, wherein step (d) comprises the steps of:

- (d.1) determining which conditions of a set of serialization conditions is applicable to a bulk virtual circuit connection request state; and
- (d.2) performing an action associated with the condition determined in step (d.1).

20. The method of claim 19, wherein step (d.2) comprising the step of performing one of sending the bulk virtual circuit connection request and not sending the bulk virtual circuit connection request.

21. The method recited in claim 18, further comprising the steps of:

- (e) storing a virtual circuit identifier in a current virtual circuit identifier parameter, the current virtual circuit identified corresponding to a current virtual circuit that can be provisioned for an end user;

(f) storing a last virtual circuit identifier in a last virtual circuit identifier parameter, the last virtual circuit identifier corresponding to the maximum value of a range of virtual circuit identifiers returned by a previous bulk virtual circuit connection request;

(g) storing a status of a previous request for a bulk virtual circuit connection in a status parameter;

(h) storing a delta threshold in a delta threshold parameter, the delta threshold indicating the point at which a new bulk virtual circuit connection request is to be sent to establish additional virtual circuit connections;

(i) storing a current time in a current time parameter;

(j) storing a pre-determined time threshold corresponding to maximum time duration in which a pending bulk virtual circuit connection request is expected to complete;

(k) determining whether the difference between the last virtual circuit identifier and the current virtual circuit parameter is greater than the delta threshold;

(l) wherein step (d) comprises the step of determining which one of the following conditions (1) – (5) is applicable if the difference between the last virtual circuit identifier and the current virtual circuit parameter is not greater than the delta threshold:

(1) the status parameter has a SUCCESS value and the difference between the last virtual circuit identifier and the current virtual circuit parameter is less than the delta threshold;

(2) the status parameter has a FAIL value;

(3) the status parameter has a SUCCESS value and the difference between the last virtual circuit identifier and the current virtual circuit parameter is greater than the delta threshold;

(4) the status parameter has a IN\_PROCESS value and the difference between the current time and the start time is less than the time threshold;

(5) the status parameter has a IN\_PROCESS value and the difference between the current time and the start time is greater than the time threshold; and

(m) determining whether to send a bulk virtual circuit connection request in accordance with the determinations made in step (k) and step (l).

22. The method of claim 21, further comprising the step of provisioning the virtual circuit for the end user if the difference between the last virtual circuit identifier and the current virtual circuit parameter is greater than the delta threshold.

23. The method recited in claim 22 further comprising the step of sending a bulk virtual circuit request if one of conditions (1.1), (1.2) and (1.5) is satisfied.

24. The method recited in claim 18, further comprising the steps of:

(e) creating a conditions table having a plurality of conditions, each condition having a corresponding action to be performed if the condition is satisfied.

(f) determining which one of the plurality of conditions applies; and

(g) performing the action corresponding to the applicable condition.